2021 Massachusetts Safety Belt Usage Observation Study

Prepared for

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August 2nd, 2021

Introduction

This report presents the results of the 2021 Safety Belt Usage Observation Study conducted within the Commonwealth of Massachusetts. The observations and report were completed by the University of Massachusetts Traffic Safety Research Program (UMassSafe) located at the University of Massachusetts Amherst. This observational study was conducted as part of an effort to evaluate safety belt usage in the Commonwealth as directed by the Executive Office of Public Safety and Security's Office of Grants and Research Highway Safety Division (EOPSS/OGR/HSD).

The reported safety belt usage rate in Massachusetts, a secondary law state, has been consistently lower than the national average. The results of the safety belt usage observational surveys in Massachusetts from 2012 – 2021 are presented in Table 1 below. It is important to note that safety belt usage data was not conducted in 2020 due to the COVID-19 pandemic.

Table 1 Massachusetts Safety Belt Usage Rates, 2012-2021

Observation Year	Observed Safety Belt Usage Rate (Weighted and Rounded)
2012	73%
2013	75%
2014	77%
2015	74%
2016	78%
2017	74%
2018	82%
2019	82%
2020	No Survey – COVID 19
2021	78%

Source: Highway Safety Division, 2019 Massachusetts Safety Belt Usage Observation Survey

In 2021, the Safety Belt Usage Observation Study consisted of a single stage statewide survey assessing safety belt usage in the Commonwealth of Massachusetts, in compliance with the federal requirements of Uniform Criteria for State Observational Surveys of Seat Belt Use (23 CFR Part 1340).

The sampling model used in this effort was developed and approved by the National Highway Traffic Safety Administration (NHTSA) prior to the 2018 study. The sampling plan adopted in 2018 was a departure from the previous protocol that had been employed since 2012. Similar to the previous protocol, current protocol included the sampling of segments for inclusion based upon roadway lengths proportional to the total length within the given stratum. Roadways were stratified based on roadway classification and geographic region, with the observation time period randomly selected to ensure adequate representation of daylight hours.

Review of Sampling and Observation Approach

Massachusetts is composed of 14 counties, 12 of which account for over 99% of the passenger vehicle crash-related fatalities in the state, according to the Fatality Analysis Reporting System (FARS) data average for the period of 2010 to 2014. The regions for the safety belt observations were initially identified using both geographic proximity to one another and the annual traffic fatality count (a measure of importance within the revised sampling guidelines). As a result, the sampling plan included a selection of roadways from 7 regions that are comprised of 12 counties (all but Nantucket and Dukes) as presented in Table 2 and Figure 1. Within each region, 21 hour-long observations were made at randomly assigned time of day/day of week combinations. In total, the observation teams visited 147 locations across the Commonwealth.

Table 2 Passenger Vehicle Fatality Counts by Developed Region (2010 to 2014)

Region	County	County		Region	
		Number of Fatalities	Percent of All Statewide Traffic Fatalities	Number of Fatalities	Percent of All Statewide Traffic Fatalities
1	Berkshire	57	3%	286	16%
	Franklin	26	2%		
	Hampden	164	9%		
	Hampshire	39	2%		
2	Worcester	268	15%	268	15%
3	Middlesex	232	13%	232	13%
4	Essex	176	10%	176	10%
5	Norfolk	166	9%	293	16%
	Suffolk	127	7%		
6	Bristol	231	13%	231	13%
7	Barnstable	100	6%	291	16%
	Plymouth	191	11%		
Non-Sampled Counties	Dukes	7	0.4%	7	0.4%
	Nantucket	0	0%		

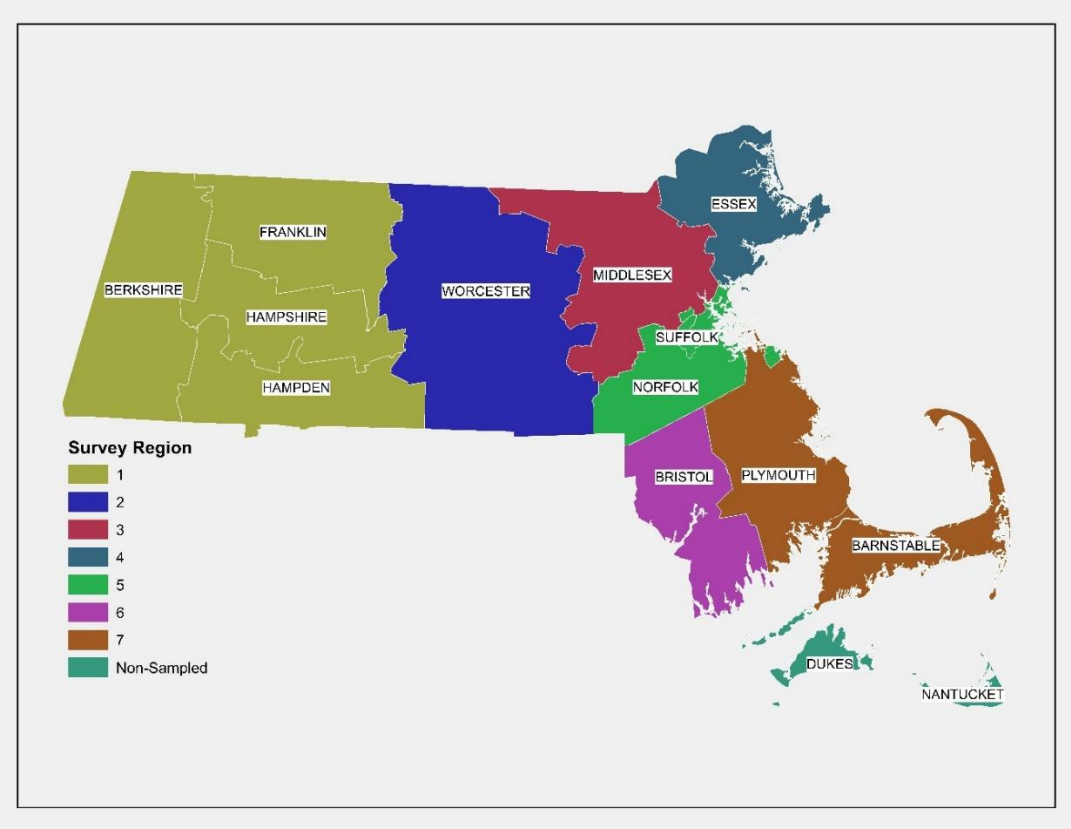

Figure 1 Massachusetts Counties and Study Regions

Using 2016 TIGER data developed by the U.S. Census Bureau, a listing of road segments was selected which have been classified by the U.S. Census Bureau using the MAF/TIGER Feature Class Code (MTFCC). There are primarily three roadway classifications: 1) Primary Roads, 2) Secondary Roads, and 3) Local Roads (See Table 3 for detailed definitions). In addition, the listings include segment length as determined by TIGER. This descriptive information allowed for stratification of road segments, while a systematic probability proportional to size (PPS) sample was employed to select the road segments to be used as observation sites.

Table 3 Massachusetts MTFCC Codes Included by Default in the Road Segment File

Code	Name	Definition
S1100	Primary Road	Primary roads are generally divided, limited-access highways within the interstate highway system or under state management, and are distinguished by the presence of interchanges. These highways are accessible by ramps and may include some toll highways.
S1200	Secondary Road	Secondary roads are main arteries, usually in the U.S. Highway, State Highway or County Highway System. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at-grade intersections with many other roads and driveways. They often have both a local name and a route number.
S1400	Local Neighborhood Road, Rural Road, City Street	These are generally paved non-arterial streets, roads, or byways that usually have a single lane of traffic in each direction. Roads in this feature class may be privately or publicly maintained. Scenic park roads would be included in this feature class, as would (depending on the region of the country) some unpaved roads.

Although not a variable used for sampling, the day of week/time of day observations were aggregated for analysis consistent with previous years for comparison purposes. The aggregation was as follows and corresponds to the observation periods:

- Weekday A.M. Peak Period (7 a.m. to 10 a.m.)
- Weekday Midday Peak Period (10 a.m. to 3 p.m.)
- Weekday P.M. Peak Period (3 p.m. to 7 p.m.)
- Weekend Period (Saturday/Sunday 7 a.m. to 7 p.m.)

Once they had arrived at their assigned location, the two-person teams observed and recorded the following attributes for occupants of passing vehicles:

- Vehicle information:
  - Vehicle type (passenger, SUV, pick-up, mini-van, small commercial vehicle)
  - State of vehicle registration (MA, NH, other)
- Shoulder belt usage:
  - Driver seat belt usage
  - Front seat outboard passenger seat belt usage
- Vehicle occupant information
  - Driver apparent sex
  - Driver apparent age (teen, adult, elder adult)
  - Driver apparent race (White, Black, Hispanic, other)
  - Passenger apparent sex
  - Passenger apparent age (child, teen, adult, elder adult)
  - Passenger apparent race (White, Black, Hispanic, other)

Please note that although it was not needed, the approved sampling plan allowed for the addition of sites should the calculated variance not achieve plus/minus 2.5% as required with NHTSA protocol.

Results and Discussion

Between the 8th and 26th of June 2021, a total of 22,855 drivers and front outboard passengers in a total of 20,953 vehicles were observed at 147 observation locations statewide. The statistically weighted percentage of front seat occupants properly using safety belts during the observational study was **77.5%**. Based upon the variation in the sampling plan, the 95th percent confidence interval ranges between 76.06% and 79.01%, with a relative error well below the required 2.5% threshold. This number is nearly 4.1 percentage points lower than the same rate observed in 2019 and is representative of the lowest observed rate in Massachusetts since 2017. In an unweighted format, the percentage of belt usage was 81.07, a notable decrease from the value of 84.15 in 2019. Table 4 presents a breakdown of observed variables in a weighted format while providing a comparison to both 2018 and 2019. The change in percent (i.e. not percent change) of usage by variable from 2019 to 2021 is also present in Table 4.

Given the 4.1 percentage point decrease (81.60 to 77.50) in the weighted safety belt usage rate, additional consideration across variables is warranted. Some of the interesting findings include, but are not limited to the following:

- Female drivers and occupants continue to have a higher observed belt usage rate than males at 84.2% and 72.6%, respectively. Within the observation sample of those with known belt status and apparent sex, males accounted for 55.7% and females accounted for 44.3%. Mirroring the

overall 2021 results compared to 2019, male and female safety belt rates were reduced by 4.2 and 2.8 percentage points, respectively.

- Of the various age groups, adults and elder adults closely mirrored the overall decline of belt usage statewide. Of interest, the observed usage rate for teens increased 2.8 percentage points, widening the margin between teens and adults by 10 relative percentage points, at 86.8% and 76.5%, respectively.

- In the category of apparent race, Hispanic and Black occupants had the most significant decrease in observed safety belt usage, at 9.5 and 10.7 percentage points, respectively. That said, Hispanic occupants continue to have the lowest belted rate in comparison to other apparent races, with an observed usage of 62.1%.

- For state of vehicle registration, 91.1% of occupants were observed in a Massachusetts registered vehicle, resulting in a safety belt usage rate of 77.6%, a 3.8 percentage point reduction from 2019. Comparatively, the belt usage of vehicles registered in New Hampshire was 77.8%, a slight increase of 0.7 percentage points from 2019. The highest safety belt usage was found for vehicles registered outside of Massachusetts and New Hampshire, although still mirroring the overall trend of five relative percentage points less than 2019, at 81.0% and 85.7%, respectively.

- Occupants from passenger cars, which represented 34.7% of total observations, experienced the greatest decrease of belt usage at nearly six percentage points to a rate of 77.1%. In addition, small commercial vehicle belt usage was reduced by 3.6 percentage points from 2019, resulting at 54.1%, proportionally significant given their historically low usage rates.

- Amongst time-of-day variables, p.m. peak observations resulted in the most significant loss of safety belt usage, a decrease of 6.7 percentage points to 75.9%. Interestingly, the weekend observation period resulted in an improved belt usage of 3.6 percentage points to 81.7%. A.m. peak and midday observations were also belted less often than prior years, mirroring the statewide trend.

- Geographically, region 4 (Essex) and region 7 (Barnstable/Plymouth) had the largest reduction of safety belt usage from 2019 to 2021, with 5.8 and 5.5 percentage point decreases, respectively. region 2 (Worcester) and region 5 (Norfolk/Suffolk) had the least significant decreases in their belt usage rates, at 0.5 and 2.1 percentage points, respectively.

- 16 percent of observed vehicles had a front seat passenger. Passenger presence was a significant belt usage factor for drivers; those observed without a passenger had a belted rate of nearly eight percentage points less than drivers with a passenger, at 75.5% and 83.4%, respectively. This behavior factor is nearly four times higher in 2021 compared to 2019, at a relative 11 versus three percent, respectively. Additionally, front outboard passengers experienced an improvement of 5.8 percentage points compared to their safety belt usage rate in 2019.

- In the category of roadway classification, safety belt usage on primary (interstate) roadways had the largest decrease of 7.3 percentage points, while local roads had the smallest decrease of 3.5 percentage points. That said, local roads continue to represent the lowest belt usage rate at 75.5%.

Table 4 Summary of Weighted Study Data by Observation Variable with Known Belt Status

Observation Variable	2021 Data		2019 Data	2018 Data	Change in Percentage (2021 vs. 2019)
	Total Observed Occupants	Weighted Percent Belted	Weighted Percent Belted	Weighted Percent Belted	
All Vehicle Occupants	22,855	77.53%	81.63%	81.58%	-4.10%
Apparent Sex					
Male	12,534	72.59%	76.81%	77.77%	-4.22%
Female	9,985	84.17%	86.95%	86.69%	-2.77%
Status Unknown	336	84.29%	87.23%	73.66%	-2.95%
Apparent Age					
Child (passenger <12)	130	93.78%	93.25%	93.48%	0.54%
Teen	618	86.83%	84.09%	86.89%	2.75%
Adult	18,293	76.45%	80.88%	80.74%	-4.43%
Elder Adult (>65)	3,584	82.29%	85.34%	85.74%	-3.06%
Status Unknown	230	84.73%	83.57%	69.12%	1.16%
Apparent Race					
Black	1,286	68.38%	79.12%	78.75%	-10.74%
Hispanic	742	62.10%	71.56%	74.22%	-9.46%
White	19,030	78.82%	82.18%	81.65%	-3.36%
Other	1,153	82.68%	84.17%	86.89%	-1.50%
Status Unknown	644	76.77%	81.05%	80.78%	-4.28%
State of Vehicle Registration					
Massachusetts	20,832	77.63%	81.48%	81.38%	-3.84%
New Hampshire	547	77.75%	77.08%	80.34%	0.66%
Out of State (Other)	1,352	81.02%	85.70%	86.05%	-4.69%
Unknown	124	75.87%	83.77%	84.97%	-7.90%
Vehicle Type					
Passenger Car	7,940	77.05%	83.04%	84.30%	-5.99%
Pick-Up Truck	2,508	67.75%	68.44%	68.02%	-0.69%
SUV	9,829	84.22%	87.16%	85.71%	-2.94%
Van	759	86.39%	84.33%	86.94%	2.05%
Small Commercial Vehicle	1,635	54.14%	57.72%	54.10%	-3.58%
Unknown (other)	184	81.91%	76.58%	85.33%	5.33%
Time of Day/Day of Week					
A.M. Peak – Weekday	5,024	75.36%	80.21%	81.01%	-4.85%
Midday Peak – Weekday	8,724	78.07%	82.44%	79.21%	-4.37%
P.M. Peak – Weekday	4,334	75.87%	82.57%	80.46%	-6.70%
Weekend	4,773	81.74%	78.12%	86.58%	3.62%
Observation Region					
Region 1	2,466	75.17%	79.06%	83.76%	-3.88%
Region 2	1,597	75.50%	76.02%	78.24%	-0.52%
Region 3	4,665	78.73%	82.64%	83.60%	-3.90%
Region 4	4,188	78.58%	84.38%	81.76%	-5.81%
Region 5	3,447	81.88%	83.98%	85.06%	-2.10%
Region 6	3,508	75.39%	79.46%	79.97%	-4.07%
Region 7	2,984	76.95%	82.46%	77.75%	-5.50%
Occupant Role					
Driver Alone	16,582	75.53%	81.00%	80.14%	-5.46%
Driver with Passenger	3,384	83.35%	83.46%	85.45%	-0.11%
Passenger	2,889	84.50%	78.68%	84.42%	5.83%
Roadway Classification					
Primary (Interstate)	2,375	77.12%	84.42%	82.70%	-7.30%
Secondary (Arterial)	7,677	81.93%	86.09%	83.77%	-4.16%
Local (All others)	12,803	75.49%	78.94%	79.62%	-3.45%